NOTES ON STONEHENGE.[1]

IV.—THE EARLIEST CIRCLES (*continued*).

THE conclusion at which I have arrived is that the older temple dealt primarily, but not exclusively, with the May year; the newer temple represented a change of cult, and was dedicated primarily to the solstitial year. In both, however, the sunrises and sunsets of the June-December and May-November years could be, and doubtless were, observed. I direct attention to the following considerations in support of this theory.

(1) The blocks of unworked sarsen, perhaps dating from a time when the use of stone tools for working stone in Britain was unknown, are precisely those which give us the alignments, both for the May and June years.

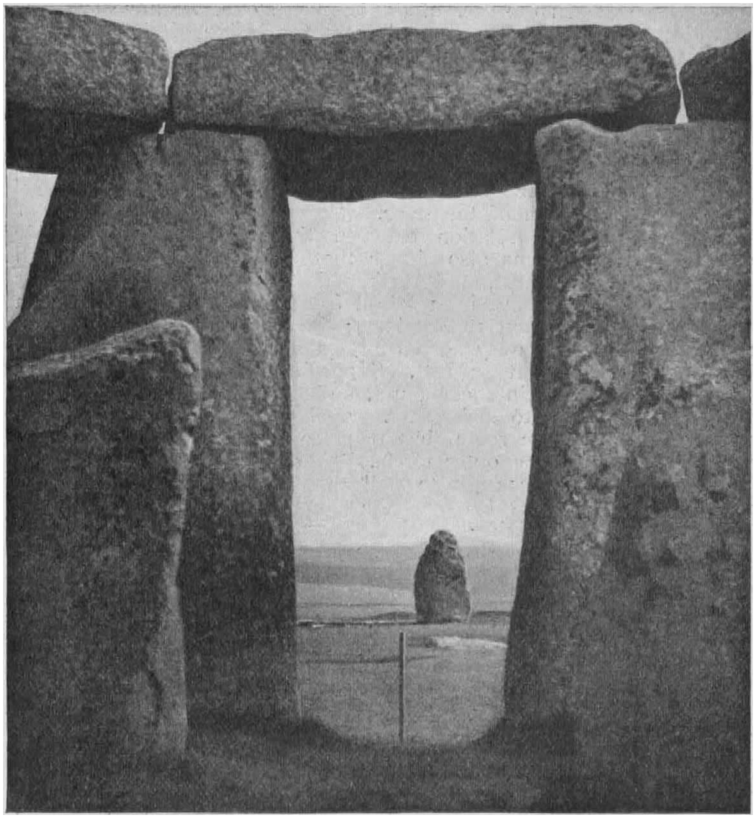

FIG. 10.—The vertical rod is placed in the axis, and marks the common direction of the present temple and avenue, which passes about 3 feet to the N.W. of the Friar's Heel.

(2) The blue stones, unworked for the same reason, may have originally composed two circles and a central stone as a start point for these alignments. The central stone, marking the centre of the two concentric circles, would naturally stand half-way between the N.W. and S.E. exterior sarsen stones.

In this first simplest form we should have the equivalent of the ancient temple described by Virgil, with the uncovered altar at the centre after the Etruscan fashion.

> "Ædibus in mediis, nudoque sub ætheris axe,
> Ingens ara fuit."

It is sad to think that at Avebury not so very many years ago there were two such double circles as those I postulate. They have now almost entirely disappeared. The central observing place, a cove, in the northern circle still remains with some of the stones of the outermost circle; all the rest have been taken up, broken, and used for building. Truly the English are a "practical" people.

(3) At the reconstruction, about 1680 B.C., the solstitial cult was made predominant, and for some reason or other it was determined to change the centre of the circles in the new structure, and throw the N.E. alignment nearer the north, still remaining parallel to its old direction.

There may possibly have been two reasons for the reconstruction of the temple about the time I have named. At the date mentioned the place of sunrise from the old centre, which I have indicated, was hidden by the Friar's Heel, unless the observer, the high priest, were raised some few feet above the ground at its present level. It may have happened, then, that the difference of the sunrise place, brought about, as we now know, by the gradual reduction of the obliquity of the ecliptic, had shown itself in a very unmistakable way to the priests; in 2680 B.C. it was certainly well to the north of the Friar's Heel, and occupied an uninterrupted horizon, so that they might well wish to secure a clear horizon for the future; this they found by moving the centre of the circles, and therefore the solstitial line, a few (about 4) feet further to the N.W., still preserving their ancient pointer.

But this is not all. Colonel Johnston, the director of the Ordnance Survey, has obligingly pointed out to me that the present centre of Stonehenge, Sidbury Hill to the N.E., and the earthworks at Grovely Castle and Castle Ditches to the S.W., all lie exactly on the solstitial line in 1680 B.C. The top of Sidbury Hill may, then, have been taken for the new pointer, in which case the earthwork camp some 30 feet high on the top had not been built, for it lies a little to the north-west of the line.

(4) While it was determined to erect a temple on a much larger scale by the addition of a larger exterior circle of sarsens and a naos also of trilithons, it was also determined to utilise the unworked blue stones composing the two circles. But while the new sarsens were shaped where they were found (for the very good reason stated by Prof. Judd), the blue stones were taken up and trimmed *sur place* as the new more northerly line and the new centre, to say nothing of the new naos, necessitated their re-arrangement. In this way the excess of blue stone chippings found by Prof. Gowland is simply and sufficiently explained.

(5) It is quite possible that the rebuilding of the temple in 1680 B.C. was part of a very large general plan which could only have been undertaken by a large, powerful and comparatively civilised tribe or people under strict government, commanding the services of skilled mathematicians, for Colonel Johnstone's revelations do not stop at the continuation of the Stonehenge solstitial line to Sidbury and Grovely Castle.

The absolute straightness of this line might have been secured by fires at night, but there is more in it than this. Stonehenge, Old Sarum, and Grovely Castle occupy the points of an equilateral triangle of *exactly* six miles in the side, and the three sides are continuations of the entrances at Stonehenge and Old Sarum and of a ditch running through the centre at Grovely Castle. Further, the centre of the triangle is on the oldest cross roads in that part of Salisbury Plain.

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[1] Continued from p. 368.

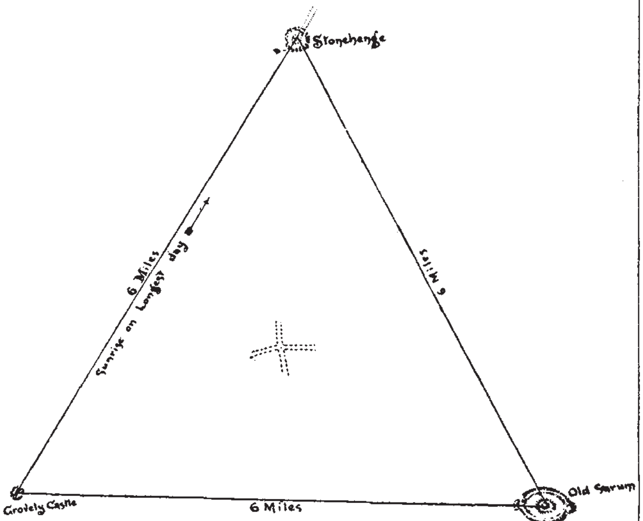

FIG. 11.—The equilateral triangle formed by Stonehenge, Old Sarum, and Grovely Castle.

The figures will show this, and also the curious position of other earthworks, as well as the fact that the line Stonehenge—Old Sarum passes *exactly* through Salisbury spire, which again is exactly two miles from Sarum. We ought to restore the old name, Solisbury.

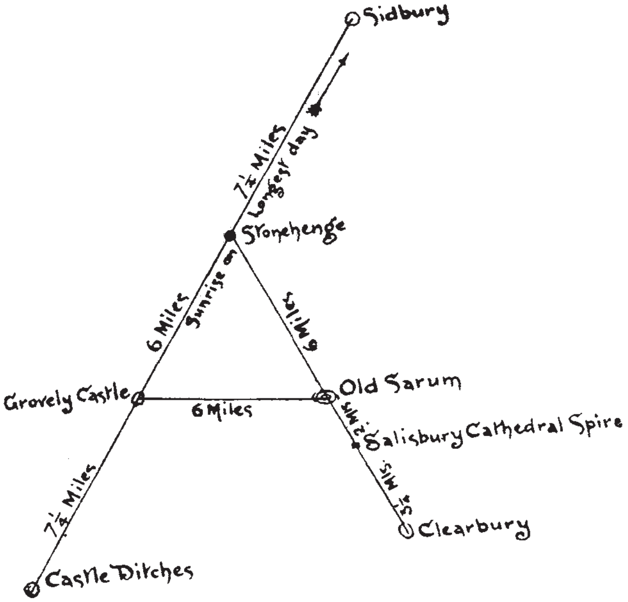

FIG. 12.—Showing the prolongations of the sides of the equilateral triangle.

(6) It is probable that the avenue and vallum were added when the line of orientation was moved to the N., placing the new centre to the N.W. of its original position. In this way we can explain how it is that the Friar's Heel lies to the S. of the central line of the avenue, and that the N.W. and S.E. stones are situated at different distances from the vallum.

(7) The number and spacing of the sarsen stones in the new great circle were so chosen that the use of the N.W. and S.E. stones to mark the May new year's day originally could be replaced by observations through one of the trilithons. This was necessary if the May year was to be considered at all, as the use of the N.W. and S.E. stones was blocked by the new outer circle.

Now, on the hypothesis of an earlier temple, it becomes quite clear, from the method of erecting the sarsens revealed by Prof. Gowland's excavations, that the stones comprising the two concentric circles must have been removed, even if there were no other reason.

In the case of the leaning stone, we have evidence that it was erected from the inside of the circle, as the perpendicular wall of chalk is on its S.W. side. If all the other naos sarsens were erected in the same way, there could have been no upright blue stones in the naos. They must have been set in the places they occupy afterwards, because the upright members of the naos trilithons are well over 20 feet long, and this about represents the distance to the central portion of the naos.

The relation between the naos and outer circle trilithons also shows that the naos must have been built first, and further that the outer circle sarsens must have been raised from the inside. Those fallen are about 18 feet long; the average distance between the two systems of naos and outer circle trilithons is about 23 feet. Supposing the outer sarsens are 4 feet in the ground, and that there was a slope for them to slide down some 6 feet long, there would just be room, but none to spare, between the naos and the outer circle. There certainly would not be room enough to pull the stones upright unless the intervals between the naos sarsens were used, and the positions of the stones show that they could not have been conveniently so used, in some cases at all events; we may assume that to pull the stones finally into their perpendicular positions ropes at least as long as those employed by Mr. Carruthers would be needed.

In any case the blue stone circles must have been away, whether removed from their old positions or not, when the naos and sarsen circle were put up.

On this point Prof. Gowland is quite clear.

He writes: "That the stones of the central trilithon were erected from the inside of the circle has been conclusively demonstrated by the excavations, hence the 'blue stones' in front cannot have been erected before them. Moreover, the 'blue stone,' No. 68, the base of which was laid bare in Excavation V., was found to be set in the rubble which had been used to fill up the foundation of No. 56, and further, in a lower layer than its base, there were two small blocks of sarsen with tooled surfaces.

"Whether the outer sarsens were set up from the inside of the circle like the trilithons, or from the outside, is a point which can only be settled by future excavations. If from the inside their erection must have preceded that of the trilithons, and hence of the 'blue stones.'

"On the other hand, should the outer sarsens have been raised from the outside, it would not be possible for the 'blue stones' to have been placed in position before them, as they would then have seriously interfered with if not altogether prevented the erecting operations."

We may take it, I think, that the ring was erected from inwards, sufficient ground only being available outside for "a long pull and a strong pull."

In former notes I have referred to Mr. Cunnington's remarks on the remains of the syenite trilithon, and his suggestion that it formed part of an older temple. He expressed the view that the structure of Stonehenge as we know it with its trilithons was, in fact, suggested by it.

Now if we attempt to find the place it occupied before it fell by seeing where it would be most symmetrically placed in relation to the adjacent stones of the blue stone circles still standing, we are led to an interesting result. Using the old centre as determined from the N.W. and S.E. stones we find that the May sunrise would be seen through the small syenite trilithon. In this way also we can account for the fact that so far as is known this is the only trilithon which existed in the old blue stone circle; it may well have been that the centre and diameter of the new blue stone circle were so regulated as to retain it in position; I have already remarked that this was done in the case of the older unhewn sarsens, as a memorial of the past.

NORMAN LOCKYER.

THE APPROACHING TOTAL SOLAR ECLIPSE OF AUGUST 30.

THERE are many special features about the total solar eclipse of August of the present year. In the first place, perhaps the chief of these is that it will occur about the time when the solar atmosphere is greatly disturbed, or in other words, at a time when the number of sun-spots is about a maximum. Second, the localities from which it may be observed are well distributed over land surfaces, and some are easily accessible from the British Isles. Thirdly, observers will have to wait many years before another favourable eclipse occurs. That in 1907 will be visible in Central Asia, but its occurrence in January will deter many from seeing it. The two eclipses in 1908 will be visible only from the Pacific and South Atlantic. The eclipse of 1909 will occur in June in Greenland, while that in 1910 will be visible only from the Antarctic regions. In 1911 only a short portion of the end of the eclipse track will pass through a part of South Australia. It is therefore the eclipse of 1912, that will take place in April in Spain, which will be the next easily accessible one to observe; but as totality will only last 60 seconds, its duration will be brief compared with that of this year, which will last for more than 3½ minutes.

Further, the fact that the approaching eclipse occurs in a month, such as August, when a great number of people are taking their summer holiday, and therefore can more easily leave these shores, should ensure the presence of many volunteer observers at the more easily reached stations. In the present instance the zone of totality commences in Canada towards the south of Lake Winnipeg, skirts the extreme south of Hudson's Bay, passes a little to the north of Nova Scotia, and then crosses the Atlantic. In Europe it strikes Spain (Fig. 1) on its north-west coast line, and leaves the eastern coast, enveloping the islands of Majorca and Iviza. Reaching Africa in the neighbourhood of eastern Algeria (Fig. 2), it passes through Tunis, Tripoli, Egypt, and the Red Sea, and finally terminates in Arabia.

In Spain an opportunity is afforded of making observations at some stations of high altitude, for the eclipse track includes several lofty mountains. For instance, Penas de Europa, south-west of Santander, and 8000 feet high, is one of numerous possible observing peaks, and advantage should be taken of this or some other elevated region.

It will thus be seen that there is plenty of scope for observers to scatter themselves along the line of totality, and this should be done as much as possible. The low altitude of the sun during totality at Labrador (27°) and Egypt (24°) renders both these regions somewhat unfavourable for the best observations, but there parties should at any rate be present. The former region can undoubtedly be left to Canadian and American observers, for it does not seem necessary that European observers should journey so far when more favourable stations are nearer at hand. The close proximity of Egypt to many European countries renders this part of the zone of totality easily accessible. Here the central line of totality passes just a little north of Assuan, the outer limits enclosing Edfu on the north and Darmut on the south.

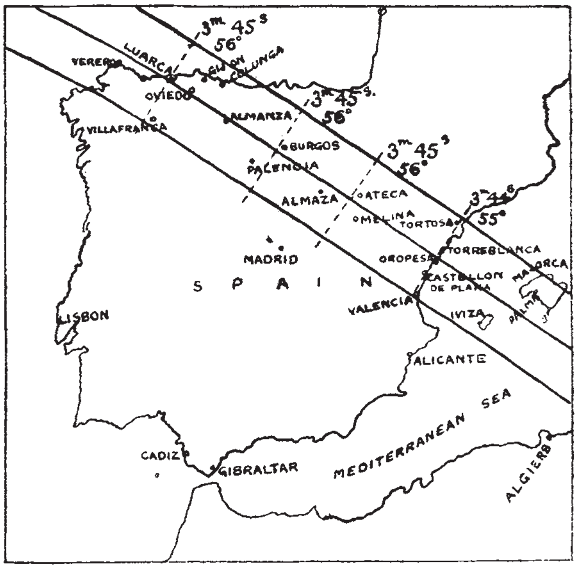

FIG. 1.—The path of totality across Spain. The duration of totality and the altitude of the sun at that time are given for four different stations along the line.

The probable weather conditions at the different stations form an important item in eclipse matters, for clouds can easily mar the work of even the best organised expedition. Omitting Labrador, a station that will not be occupied by observers from this country, the north-western portion of Spain does not seem to be particularly favoured with the required weather conditions. According to Señor F. Iñiguez, the director of the Astronomical and Meteorological Observatory of Madrid, this locality during August is not only cloudy and damp, but storms are of frequent occurrence. Such a report, however, should not prevent one party at least from taking up a position there, but it should suggest to many who had up to the present made up their minds to observe in that locality to seek stations further along the line, and not congregate at a very probably unfavourable station such as this appears to be. At stations towards the east the conditions seem to be more suitable the closer the Mediterranean side is approached, and, according to the authority mentioned above, the probability of fine weather on this coast is very high. Inland stations will probably have the disadvantages of dust and heat combined.